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## THE STATISTICAL WORK OF THE UNITED STATES GOVERNMENT

WALTER F. WILCOX: This is the first time that the American Economic Association and the American Statistical Association have met in joint session and the second that they have in coöperation considered the topic which is now our theme. The memory of some older members of the two Associations instinctively runs back this morning to the time, more than eighteen years ago, when joint committees of these Associations met around a table in New York to consider the terms of a memorial to Congress in favor of a permanent Census Bureau. The attendance was large and representative, the sessions prolonged and animated, not to say stormy. Finally, the committees reached substantial agreement and the memorial then drafted exerted, I believe, an appreciable influence upon the decision of Congress five years later to make the bureau permanent.

Two earlier precedents are even more encouraging. The first significant improvement in American census practice was made in 1800, with the purpose of testing the healthfulness and longevity of the American population. An age classification of the free whites into five periods was then introduced. This concession to non-political considerations resulted directly from petitions originating with the recently reorganized Connecticut Academy of Arts and Sciences, and effectively supported by similar petitions from two older and more influential learned societies, the American Academy of Arts and Sciences at Boston, and the American Philosophical Society, located at the seat of government in Philadelphia and under the presidency of Thomas Jefferson, then Vice-president of the United States.

The longest forward step ever taken by federal statistics was probably that between the censuses of 1840 and 1850. The changes then introduced were due in no slight degree to the egregious blunders in the census of 1840, to which students had called attention, and to petitions for an improved census emanating from the New York Historical Society, and the then youthful American Statistical Association. In now debating the condition of federal statistics, with a view to determining our individual responsibilities as scholars and our collective responsibilities as learned societies towards its present and future condition, these Associations are following a line of notable and cheering precedents.

If one hopes to contribute individually to the improvement of federal statistics, the first essential is a thorough knowledge of the actual conditions under which the work is done and of the field of inquiry with which the figures are concerned. It is seldom possible to get this knowledge from printed official reports. For example, the census of 1870 reported that 12 per cent and that of 1910 that 21 per cent of American negroes were mulattoes. The obvious interpretation is that these two races have been intermingling rapidly since the Civil War. We are not informed that in 1910 for the first time many of the enumerators employed were Negroes, that private inquiries conducted by Negro enumerators have shown a proportion of mulattoes much greater than census returns of similar date and place, and that this administrative innovation may explain much or all of the reported increase of mulattoes. The figures do not prove and perhaps hardly strengthen the inherent probability that miscegenation has increased.

How many members of our Association who use the statistics of immigration know, what they could hardly learn from the reports of the Bureau of Immigration, that the meaning of the word *immigrant* as its statistical unit has been several times altered by bureau circulars and the comparability of the figures for successive years disturbed? How many know that until recently an immigrant bird of passage was counted as an immigrant when he arrived in the spring, was not counted when he departed in the fall, and was counted again as often as he returned?<sup>1</sup>

Closely related with this need for a thorough knowledge of any inquiry whose results one uses is the need for measuring or estimating the amount and direction of the error in the results. This is quite other than the probable error with which mathematical statisticians are concerned. It seeks to learn whether the reported figures are above or below the truth and by how much. In a complicated series of inquiries each set of answers has its own margin of error, and an estimate of one throws little light on another. The reported number of married women is slightly too large because for a woman to allege marriage is to state a claim; the reported number of divorced women is far too small because such a report is a confession of fault or failure.

The greater the importance of one's statistics for the purpose he has in hand, the stronger becomes the need of determining

<sup>1</sup> See the writer's "Our Gain in Population through Immigration" in *National Civic Federation Review*, Nov.-Dec. 1906, p. 7.

whether they may be trusted to the degree implied in the argument, just as the taller the building, the deeper and firmer must be its foundations. Is there no danger that towering and impressive constructions of economic speculation are being erected both in the United States and in Europe with too little effort to make sure that the statistical foundation is bed-rock? Is there no danger that some of these may prove ultimately to be ill-founded? This is a peril against which mathematical statisticians may need to be warned. To voice that warning, I cite two examples from the mistakes of mathematical geniuses.

Before and for many years after 1790, when the United States took the first national census on record, the opinion was current among European statisticians that to enumerate a country's population was impracticable. Needing to know the population of France, Laplace secured a count of the residents in certain scattered districts and also of the annual number of registered births in these districts and in the country. These facts gave him a ratio between births and population which he applied to the whole of France. The process was legitimate, but in defending it Laplace went into an elaborate mathematical demonstration showing with pages of formulae that there was not one chance in one thousand that the error of his estimated population would exceed half a million. Today it is demonstrable that his estimated population was under the truth by more than two million, or 9 per cent of the total, and that the mistake lay not in his mathematics but in the number of registered births in France, to which he applied his ratio.<sup>2</sup>

If any mathematician held a position in the United States at the end of the nineteenth century comparable to that held by La-

<sup>2</sup>The earliest and fullest statement of Laplace's argument is in his contributions to *Histoire de l'Académie Royale des Sciences* for 1783, printed at Paris in 1786. After several unsuccessful inquiries of the larger American libraries, these volumes were found in the library of the American Philosophical Society of Philadelphia, which kindly sent them to Ithaca for my use. Laplace clung to this method at least until 1814, when his *Essai Philosophique sur les Probabilités* appeared (See *Oeuvres Complètes*, 1843-47, Vol. VII, pp. lvi, f.) and his disciple Quetelet until 1827, when its keen criticism by de Keverberg won Quetelet over to the method of enumeration, of which he soon became the most convincing and effective advocate. My criticism applies to the form of Laplace's estimate set forth in his *Essai Philosophique*, because in that form it can be tested by census and registration figures. For evidence that his estimated population of France, 28,352,845 in 1802, was below the census figures and that those were below the truth, see Jacques Bertillon's *Stat. Intern. résultant des Recensements* (1899), pp. 30, 31.

place in France at its beginning, it was probably Simon Newcomb. Because of his eminence, I venture to feather my warning shaft with an example from his statistics. In his brief *Statistical Inquiry Into Sex in Human Offspring*<sup>3</sup> a main object was to show that "the treatment of statistical data generally on a large scale by the rigorous methods of probable induction leads one into a field the cultivation of which promises important results to the science of the future."<sup>4</sup> The first of his six conclusions was: "The preponderance of male over female births probably varies with the race . . . it seems to be either non-existent or quite small in the negro race."<sup>5</sup> This conclusion was founded entirely upon census figures which are subject to a margin of biased error, so wide that they have no probative value. Furthermore, the conclusion is directly contradicted by the few American registration figures of births by race and sex to which no reference was made, although the best of them were published by the city in which the article was probably written.

The keen interest in economic or statistical theory which expresses itself more and more often in a mathematical dress, is not infrequently associated with a distaste for the patient and competent testing of the basic facts. This neglect may lead to building structures on foundations of sand and to compromising the reputation of our guilds in their collapse. Certainly the contrast between the magnitude of the superstructure and the slipperiness of the foundation is often glaringly apparent to those who have struggled in deep waters to lay the foundation and is in no slight degree responsible for the attitude of quizzical aloofness with which these structures are viewed by some who know much about their basis.

I dwell upon this suggestion because I have long believed it to be needed, and perhaps never more than now when the growing enthusiasm for mathematical statistics in Europe and the United States and the inability of many producers of official statistics to follow or criticize intelligently the interpretation placed upon their own figures may result in reviving a separation, which I hoped

<sup>3</sup> Simon Newcomb, *A Statistical Inquiry into the Probability of Causes of the Production of Sex in Human Offspring*, Carnegie Institution of Washington, 1904.

<sup>4</sup> *Id.*, Prefatory Note.

<sup>5</sup> *Id.*, p. 8.

was of the past, into groups of official and private statisticians, each somewhat ill-informed about the other.

The most serious obstacle to sound work in federal statistics is probably the overemphasis upon its political aspects. All official statistics are political and in a sense partisan; they cannot be entirely divorced from politics within any future period of importance to the present discussion, yet for a century their scientific or rational meaning has been slowly gaining recognition. This change it is the duty and privilege of our Associations to support and urge forward. To that end we need to provide in our universities better training for statisticians, public or private, and to instil into them a sense of the scientific value of their work. We need to exercise an influence in favor of long terms of service for statisticians who have earned retention and for the promotion of those who show natural aptitude. Perhaps nothing would further this purpose better than to see some of our large offices become training schools in producing the future official statisticians of the country. They are not now trained in our universities and they cannot be well trained without enjoying the laboratory experience of a well-managed office. Universities situated near such laboratories might profitably arrange collaboration with them, like that between medical schools and hospitals or that between many European universities and the statistical offices of the cities in which they are situated. In this respect the Bureau of the Census has proved a disappointment. It has done little to train men so that they could rise to higher positions in the office and in so doing lift the office staff to higher levels of efficiency; much less I believe than the Coast Survey or the Geological Survey or the Bureau of Corporations has done. Largely as a result of this overemphasis upon the political aspects of its work and of its neglect to train men for promotion the quality of its statistics is not improving as fast as the quality of statistics in private corporations or the quality of federal work in geology or geodesy. Perhaps indeed, the deterioration is absolute as well as relative.

What should these Associations do toward improving federal statistics?

For the present, I have but one suggestion. It would be expedient, I believe, for each Association to appoint a committee on federal statistics, with power to enlarge its membership, and to coöperate with the corresponding committee of the other Asso-

ciation. These two committees might divide the field of federal statistics between them and start a person at work, if possible, on each main field. Each coöperator would be invited to prepare a report on the recent progress and present condition of statistics within the field assigned him and to embody recommendations for its future improvement. The reports would be laid before the main committee for editing. Those which received its approval would then be submitted to the Associations for printing.

In this manner our Associations might secure for themselves and the public a series of deliberate, reasoned, and expert opinions upon the subject of our conference. If this effort should prove successful, it would aid us in deciding whether further steps were desirable. Perhaps the time would be found ripe for an expression of opinion from one or both of these Associations regarding federal work in statistics or certain branches of it which would influence it helpfully in the future as similar expressions of opinion from these and other learned societies have helped it in the past.

E. DANA DURAND: Much might be said regarding the need of extensions of the field of federal statistical work. The most important additions immediately desirable are perhaps annual statistics of manufactures and of agriculture. We already have annual returns, based on actual enumeration and not on estimate, of the mining industries and of cotton ginning, and until recently we had annual returns of lumber cut. There is equally strong demand for annual data, promptly published, of leading manufacturing industries and of the principal crops and domestic animals.

The need for current data regarding agriculture is by no means satisfactorily met by the estimates of the Department of Agriculture. The margin of error in these is extremely large. The principle followed in arriving at the acreage of crops and the number of domestic animals is to take the decennial census as a starting point and to add or subtract annually estimated percentages of change as compared with the preceding year. These percentages represent merely a consensus of guesses. An error in the estimate for one year continues to affect the figures for each year until the next census. Since errors in estimates tend, owing to psychological reasons, to continue in the same direction for a series of years, the cumulative error may become very great. For some states the estimates of the Department of Agriculture as to the acreage of certain crops for the year 1909 were several times

greater than the figures returned by the census. In some other states the Department's estimates were as much as 50 per cent too low. For the United States as a whole nearly all estimates were found at the time of the Twelfth Census to be materially too low and nearly all those at the time of the Thirteenth Census to be materially too high.

The error in the agricultural estimates would, of course, be reduced by a quinquennial census of agriculture. By a law of 1909 the Census Bureau was authorized to take a simple agricultural census in 1915 and every ten years thereafter, but the present Congress has thus far shown an indisposition to provide the necessary appropriation. In any case a quinquennial census would be only a palliative, not a remedy for the existing evils.

Annual statistics for leading crops and domestic animals, based on actual returns of farmers, would involve comparatively little expense. The rural mail carriers, who cover by far the greater part of the cultivated territory of the country, could collect the data. In course of time it would become possible to induce most farmers to fill out the schedules themselves. The Department of Agriculture recently made an experiment with this method. The proportion of farmers who filled out the schedules delivered to them by the mail carriers was comparatively small. The results of this single experiment, however, do not seem conclusive. There was no law compelling farmers to fill the schedule and farmers were unfamiliar with the scheme. A compulsory law may possibly be unwise at present. Even without it, the system should work fairly well after a few years' experience. In any case the value of accurate annual returns of agriculture would be so great as to justify considerable expense.

The inadequacy of a quinquennial census to show accurately even the general trend of manufacturing industries is obvious, while it completely fails to disclose current conditions. Were an annual canvass of manufactures undertaken it would become year by year increasingly possible to secure the returns by correspondence. This is the method used for the most part by the Geological Survey in obtaining data for mines. It has also been successfully used for manufactures in Massachusetts. The schedules for annual returns might well be far simpler than those used at the quinquennial census of manufactures. They might be confined to inquiries as to the quantity and value of the leading individual products and as to the number of wage earners, leaving inquiries as to capital, ex-



penses, materials and the like, if such are deemed necessary at all, for the quinquennial or even the decennial enumerations.

In this connection it should be noted that even the elaborate quinquennial censuses of manufactures fail to present a great deal of information which is in strong demand. As regards many industries, there has been no attempt to ascertain the quantity or value of specific products. While, for some of these industries, it is scarcely practicable to obtain such data, there are others for which they could be obtained. Moreover, there is much demand for information regarding industries more narrowly limited than those distinguished by the census classifications. Owing to the fact that several branches of business are often carried on by a single establishment, the Census Bureau has more and more adopted the policy of classifying establishments according to very broad groups. When tariff bills, for example, are under discussion, information is demanded for specific industries, not groups of industries. Such information could be compiled and published at least for selected establishments which are free, or largely free, from the complexity of overlapping.

The president of the American Statistical Association, in his annual address, suggested the desirability of a committee of expert statisticians to serve as an adviser to the statistical bureaus of the federal government. Other speakers have touched on the same thought. Doubtless a good deal could be accomplished by the creation of a joint committee of the American Economic and American Statistical Associations holding no official relation to the government. Still more, however, could be accomplished by an advisory commission created by the government and comprising statisticians and economists from the universities and other experts who would devote only a fraction of their time to the work, as well as officials continuously employed in government statistical investigations.

In order that the work of such an advisory body should be of the greatest value, its members would need to devote a good deal of time to it and to incur considerable travel expense, both in mutual consultations and in conducting investigations at Washington and elsewhere.

It will be recalled that these two Associations at the time when preparations were being made for the Twelfth Census, organized a committee to make suggestions. For the most part the work of that committee consisted of monographs prepared, wholly or

substantially, by individuals. Useful as these were, they were less useful than would be reports based on extended consultation and discussion. The holding of such consultations by members of a widely scattered committee means time and travel expense.

Moreover, it is essential for any proper criticism of the federal statistical work that the critics should thoroughly familiarize themselves with the actual methods of the various statistical bureaus—the methods of collecting the original data, of editing the schedules, and of tabulation. They must know about tabulating machinery, about processes, and about costs. They must examine original returns and gain some idea as to the margin of error in them. Statisticians outside of the government service are altogether too lacking in information on such points as these. In most branches of statistical work we need at present, far more than any extension of the field or any improvement in the methods of analysis, an increase in the degree of accuracy of the raw material. It is very largely to this task that such a proposed committee should at first address itself. Obviously, in order that a committee of experts should secure the necessary information on which to base recommendations along this line, it would be essential for them repeatedly to visit Washington and to incur considerable expense.

An official commission established by the government would presumably be able to secure appropriations for expenses of this character. Further advantages of such a commission would be the fact that it would have more complete access to information than an unofficial committee, and the fact that its recommendations would doubtless have somewhat greater weight with administrative officers and Congress.

It is possible that the necessary expenses of an unofficial committee on federal statistics might be provided for by private subscriptions. Should the proposed joint committee of the Statistical and Economic Associations find it feasible to coöperate with various commercial and business organizations, which are likewise interested in the improvement of government statistics, these organizations might aid financially in the work.

The present time is hardly propitious for legislative or administrative action creating an official advisory commission on statistics for the federal government. Every effort is being made to reduce expenditures. The first step is clearly the creation of a joint committee of these two Associations and action looking toward an

official organization should be deferred until a more suitable time. The joint committee might well consider the elaboration of a plan for such a statistical commission as part of its task.

A third topic to which I wish briefly to allude is that of coöperation between the federal government and state and local governments in statistical work. To some extent, coöperation may properly take the form of the employment of state or even municipal agencies to collect statistics for use by both the local and the federal government. The Massachusetts Bureau of Statistics has to a large extent acted as an agent for the federal Census Bureau in this way. Unfortunately, however, the standard of statistical work in most states and cities is not so high as that demanded by the federal government and the extension of coöperation of this type can be gradual only.

On the other hand, it would seem possible for the federal government to coöperate extensively with the state and local governments in another way, namely, by rendering available for special local uses the original data collected by the federal government itself for more general purposes. There is great demand in some states and cities for the presentation of more details as to small localities than are published by the federal government. This is notably true with respect to the censuses of population, agriculture, and manufactures. For example, a reasonable amount of detail regarding population and agriculture is desirable for townships; the Census presents data only for counties (except of course, that the number of inhabitants is given for townships).

The federal government properly feels that it cannot afford to tabulate and publish information as fully for small areas as it does for states or for the country as a whole. It should, however, be willing to place the results of its canvass at the disposal of the states for the purpose of more detailed local presentation, or at the disposal of individual cities, counties, or other local governments. The federal government might offer the state or local governments gratis the original schedules after it had finished with them. It might furnish, more promptly, duplicates of those schedules, the cost, which would be low, to be borne locally. Again, the federal government might, on request, itself tabulate and publish the desired details at the expense of the states or local governments. None of these plans can be satisfactorily carried out without new federal legislation. At the last census there were a

number of cases in which states or local governments were willing to bear the expense of special tabulations or of copying schedules. The census officials were perfectly willing to comply with their wishes, but found it almost, if not quite, impossible to do so under existing provisions of law, as to confidential treatment of returns and as to financial procedure.

Much of the raw material of statistics collected by the federal government is only partially utilized at present. Valuable metal is left in the ore. Further local elaboration of this material would in many cases be more useful to states and local governments than the special censuses and other statistical investigations which they themselves undertake. Coöperation is the obvious thing. Of course it would be possible also for the federal government, under proper conditions, similarly to make its statistical resources available for private organizations and even individuals.

ROYAL MEEKER: I agree with much that Professors Willcox and Durand have said. I believe that it is desirable to secure comparability and continuity in our statistical output. In revising the work of the Bureau of Labor Statistics I have kept these things in mind, and, so far as possible, have constructed the new series of price and wage indexes so as to admit of comparisons with the old indexes. The new wholesale price index number will be calculated back to 1890 so that the old index and the new may be compared throughout the whole period since 1890. The retail price index, however, has been calculated back only to and including 1907, for two reasons: first, because of the enormous amount of labor involved and the insufficient force and funds of the Bureau; and, second, because since 1907 retail prices have been much more accurately reported by merchants than previously, greater care being exercised to obtain the actual sale prices on the fifteenth of each month of the same grade of each commodity sold by each store. The price quotations before 1907 and since that date are so different that comparisons cannot fairly be made. No good purpose can be served by calculating the relative prices and index numbers back of 1907. Such a continuous series of relatives and indexes would give merely a fictitious comparability and continuity to retail price statistics, the prices themselves being discontinuous and incomparable.

It was my desire to carry back through 1907 the new index numbers showing changes in hourly rates of wages, full time weekly

earnings and weekly hours of labor in different industries. In some industries, however, the number of establishments reporting in 1911 was greatly increased over the number in 1910, so that no fair comparison could be made going back of 1911. It is unfortunate that the relatives and index numbers cannot be carried back in every instance to 1890, but I feel that it is better to make no comparisons of wages and prices rather than to make erroneous comparisons by means of a fictitiously continuous series of relative prices, wages, earnings, and hours of labor.

I sincerely hope that the proposed joint committee of the Economic Association and the Statistical Society, to advise with the statistical bureaus of the government, will be appointed. Unnecessary duplication of statistical work should be eliminated, and the statistical methods used should be standardized and made uniform. Especially is standardization and uniformization of methods needed in the different commonwealths of the United States. For example, the accident statistics of one state cannot at the present time be compared with the accident statistics of any other state because the statistical methods are so utterly at variance.

The various statistical bureaus in the federal service are getting together as never before so as to avoid duplication of effort and to agree upon the right things to do and the right way to do them. I am trying to prevail upon the various state agencies to cooperate with the Bureau of Labor Statistics and with each other in the gathering of statistics of accidents, unemployment, retail prices, wages, and hours of labor.

It is slow and discouraging work, but great good will result, if we can agree upon what statistics should show and the best methods of showing what is wanted. The committee suggested would be of great service in establishing proper statistical standards, in calling attention to the enormous quantity of costly and useless statistical output, and in eliminating duplication of work and the confusing and costly publication of more or less contradictory statistical stuff by various federal and state agencies.

Most treatises on statistics deal exclusively with statistical methods. Nothing is said about the data to which correct statistical methods are to be applied. Now all experience shows that the principal source of error in statistical work lies in the original figures collected to represent wages, prices, hours of labor, etc. It is much more important that we give attention to the gathering and

verification of the original data than that we devote our efforts to hair-splitting refinements in the methods of treating the facts gathered. With all the treatises on statistical methods, however, we have not learned the difference between right methods and wrong methods in our statistical analyses. In fact, the treatises themselves are generally very vague or perfectly noncommittal as to the applicability of a given statistical method to a given set of conditions. Some writers seem to think that it really doesn't much matter what statistical methods we employ, as approximately the same results are obtained by any and all methods. I do not hold this comfortable view. I believe there is a right way and a wrong way of doing things. I believe it is of first importance to get our facts right, but I am convinced that the most irrefragable facts are sometimes made to tell lies because they are treated by wrong statistical methods.

Long before I took charge of the Bureau of Labor Statistics, I had become very suspicious of the Bureau's index numbers, especially its retail price index. Some people here present will no doubt recall that I was wont to have fun with the Bureau's index numbers. I no longer have fun with them;—they have fun with me. As soon as I took charge of the Bureau, before I had got settled in the saddle, I set about to revise and recalculate the index numbers published by the Bureau. Perhaps some of you will recall receiving more than a year ago a letter from the Commissioner of Labor Statistics—a S. O. S. call for help. I did not have the self-assurance to set about revising the index numbers without first taking counsel with those who were best qualified to advise me in this matter. Many of you who received this distress signal may remember carefully depositing it in your waste basket. At least I received no reply from a number of economists and statisticians whom I addressed. Most of you who did reply may remember dictating a perfectly perfunctory reply which revealed either that you did not know or care much about index numbers, or that you did not wish to prolong your correspondence with the Commissioner of Labor Statistics. I want here and now to acknowledge publicly the assistance given me by Professor W. C. Mitchell and Professor Irving Fisher. Had it not been for the sympathy, encouragement, and counsel of Professors Mitchell and Fisher, I should not have had the courage to carry out the recasting of the Bureau's index numbers. I have changed the methods employed in constructing the index numbers and shifted the base period from

1890-99 to the last completed current year. It has been a most laborious and tedious undertaking, but the work is now nearly completed.

That the method used in constructing index numbers is not an inconsequential matter is shown by a brief examination of the following table:

*Prices of Potatoes for May, June, and July, 1913.*

1 Firm	May		June			July		
	2 Price	3 Relative on May base	4 Price	5 Relative on May base	6 Relative on June base	7 Price	8 Relative on June base	9 Relative on May base
804	\$0.20	100	\$0.40	200	100	\$0.30	75	150
808	0.17	100	0.36	211	100	0.32	89	188
815	0.50	100	0.40	80	100	0.35	87½	70
817	0.20	100	0.20	100	100	0.30	150	150
821	0.20	100	0.40	200	100	0.35	87½	175
City Aggregates	\$1.27	500	\$1.76	791	500	\$1.62	489	733
City Relatives	100	100	139	139	100	92	98	147

City relative for July on May base computed by averaging and multiplying relatives . . . . .	155
City relative for July on May base computed by comparing aggregate actual prices . . . . .	128

This table gives the prices of potatoes during the months of May, June, and July, 1913. These prices have already been published by the Bureau of Labor Statistics. The prices were reported to the Bureau by five identical firms in one city,—all the identical firms reporting for that city for the three months, May, June, and July.

In the first column is given the firm number. In the second column are given the money prices per peck for potatoes as reported by these five firms. In the third column the money prices are reduced to percentages or relative prices, May being taken as the base. Of course, all relative prices for that month are represented by 100. In the fourth column are given the June

prices per peck for potatoes reported by these same five firms. In the fifth column are given the relative prices in June on the May base, that is, the percentage of June to May prices. You will notice that some of the prices reported to the Bureau look very peculiar. Firm 808 reports potatoes at 17 cents a peck in May. Firm 815 reports potatoes by the peck at 50 cents in May. Clearly here we are dealing with different economic commodities. No doubt 17 cents is the price for old potatoes, while 50 cents is the price for new potatoes. Note the phenomenal changes in prices in June as compared with May. The first firm shows an increase of 100 per cent in the price of potatoes; the second firm shows an increase of 111 per cent; and the third firm shows a decrease of 20 per cent. Now I wish to emphasize that these prices are actual prices reported to the Bureau by all of the identical firms in one city that reported for the three months under consideration. We instruct our retail grocers to report new potatoes only when the sales of new potatoes make up more than 50 per cent of their total sales of potatoes. In this case it looks as if some of the firms had not strictly followed instructions, but I have as yet discovered no way of going behind the "election returns." We must rely upon the honesty and intelligence of the firms reporting. Had the prices reported by Firm 815 been called to my attention early enough, I should have eliminated it altogether—at least the price reported for May.

Now let us consider the city relative price constructed by averaging the individual firm relatives for the month of June. The simple arithmetic average of the relatives in column 5 is 158, that is, according to the information given by this relative price, prices of potatoes in this city have risen 58 per cent from May to June. By comparing the aggregate money prices we get quite a different result. The aggregate prices may be used in the construction of relative prices in this case because the firms reporting are identical for the months of May and June. Of course, if a different number of firms had reported in May as compared with June, it would be necessary either to compare identical firms or to reduce the aggregate prices to average prices to obtain anything like an accurate result. The aggregate money prices in May are \$1.27. The aggregate for June is \$1.76. Reducing both these money prices to percentages of the May price by dividing by \$1.27, we obtain as the June relative price on the May base, 139. This is almost 20 points less than the June relative price obtained by averaging in-



dividual firm relatives—a difference which certainly is not negligible and which is altogether due to the difference in method of calculating the relative prices.

Whatever may be said of the excellences of a general relative price constructed by the method of averaging relative prices built up from different bases for the purpose of showing changes in the cost of living, a relative price built up from actual money prices shows much more accurately what we want to show, namely, changes in the cost of living—changes in the cost of the same quantity of a commodity or of an unvarying market basket.

Since 1907 the method followed by the Bureau in constructing relative retail prices and index numbers has been as follows: Identical firms were compared month by month, the theory being that it is inaccurate to compare changes in relative prices of five firms one month, eight firms the following month, and ten firms the next month. In this way a relative price for February would be constructed on the January base by comparing the identical firms reporting both for January and February. Then this February relative price on the January base was multiplied into the January relative price on the base chosen for all relative prices and index numbers published by the Bureau, namely, the period 1890-99. Next a March relative price was constructed on the February base by comparing the prices of identical firms reporting for these two months. This March relative in turn was multiplied into the February relative price constructed on the 1890-99 base. In this way only identical firms were brought into comparison month by month. Now this method of bringing into comparison only identical firms is a perfectly good and accurate method, if properly applied, but applying it in this way necessitated shifting the base of the old index number every month. A relative price or index number built up by the method of averaging relative prices constructed on different bases cannot be shifted without a percentage of error that can only be guessed at. Every time the old index was shifted in the way described above error was injected into the result, and the error was perpetuated and probably cumulated month by month and year by year. I will refer to this source of error a little later on.

Applying the method of comparing identical firms month by month to the figures in the table before us, we obtain an average relative price of 93 for July on the June base, for the five identical firms reporting in both June and July. By comparing the aggre-

gate money prices reported by the five identical firms, we get the July relative price, 92, on the June base.

In column 9 are given the July relative prices constructed directly on the May base. The average of these relative prices is 147. By the method of shifting from one base to another we get a very different result. Multiplying the average relative price for July on the June base (98) by the average relative price of June on the May base (158) we obtain what purports to be the July average relative price on the May base (155). The difference between these two averages of relative prices for July on the May base is 8 points. In the first case the July prices are compared directly with the May prices. In the second case the July relative price on the June base is multiplied into the June relative price on the May base. This gives some idea of the possible discrepancies which may arise from using the method of comparing identical firms month by month, even when there is no change in firms whatsoever.

When we compare the aggregate money prices reported by identical firms in June and July, we obtain a July relative price of 92 on the June base. Now this relative price can be *shifted without error* to the May base or any base desired. This may be best shown by the following simple arithmetic:

$$\frac{\$1.76 = \text{June aggregate price}}{\$1.27 = \text{May aggregate price}} = \frac{\text{the June relative price on the}}{\text{May base.}}$$

$$\frac{\$1.62 = \text{July aggregate price}}{\$1.76 = \text{June aggregate price}} = \frac{\text{the July relative price on the}}{\text{June base.}}$$

Multiplying the July relative price on the June base by the June relative price on the May base, we have

$$\frac{\$1.62}{\$1.76} \times \frac{\$1.76}{\$1.27} = \frac{\$1.62}{\$1.27} = 127 \frac{71}{127},$$

the July relative price on the May base, which is exactly the same result as would be obtained by dividing the July aggregate in the first instance by the May aggregate. Even with changing firms and commodities varying in quality, the relative prices calculated by comparing actual prices may be shifted to any desired base by the method illustrated above with the closest possible approach to absolute accuracy. Shiftability is an indispensable quality in a relative price which must be built up by computing the relative for each month with the preceding month as the base, and then shifting the resulting relative price to the selected base period by

multiplying through by the relative price for the preceding month computed on the selected base period. If there were no other reason for changing the method of computation, this alone would seem to make the proposed change in method imperative.

The July relative price of potatoes on the May base computed by the old method employed by the Bureau is 155. The relative price of potatoes for the same month on the same base computed by the new method is 128. The difference is 27 points—a difference so great as to shake one's faith in relative prices and index numbers, if we had nothing to indicate to us whether the relative 155 was better or worse than the relative 128. In fact, however, a relative computed from actual money prices does reflect as accurately as possible the percentage changes in the cost of a given commodity. The relative 128 is, therefore, more trustworthy and exact than the relative 155.

In the same way a weighted index number of the family food budget, constructed by the use of actual money prices weighted according to the quantities of each commodity entering into consumption, is much more accurate and trustworthy than either an unweighted or a weighted index number constructed by the old method of averaging averages of relative prices to the fourth and fifth degree.

The advantage of constructing relative prices and index numbers which can be shifted to any base desired has still another important aspect. People are curious to know the percentage of price change from 1912 to 1913 or from 1907 to 1913, or for some other recent period of time. Few are interested to know by how large a percentage the prices of 1913 exceed the prices of a period as remote as 1890-99. It is impossible by means of the old series of relative prices and index numbers to calculate accurately the percentage change in prices from 1912 to 1913. For example, from the Bureau's Bulletin 140, p. 16, we learn that the relative prices of round steak were 174.3 and 199.5, respectively for 1912 and 1913. Nobody can from these figures calculate the percentage of change in the price of round steak from 1912 to 1913. The severest critics of the Bureau's price statistics almost invariably calculate the percentage of change by the short and simple process of subtraction, contenting themselves with the misinformation that the price of round steak rose 25.2 per cent from 1912 to 1913. A more "scientific" method employed is to divide both relative prices through by the 1912 relative, 174.3, thereby going through the

motions of shifting the base period to 1912, and obtaining 100 and 114.5 as the relative prices of round steak for 1912 and 1913, respectively, computed on the 1912 price as the base. The Bureau has resorted to this method in previous bulletins, to construct tables purporting to show the percentage changes in prices from year to year. This method of procedure is mathematically unsound and the result is vitiated by an amount of error than can be ascertained only by digging up the original price data and re-constructing the relative prices anew on the 1912 base. That the possible error is no negligible quantity is demonstrated by a brief consideration of the table below:

*Prices of Potatoes for June and May, 1913.*

Firm	June		May	
	Price	Relative	Price	Relative
804	\$0.40	100	\$0.20	50
808	0.36	100	0.17	47
815	0.40	100	0.50	125
817	0.20	100	0.20	100
821	0.40	100	0.20	50
Aggregate	\$1.76	500	\$1.27	372
Relative price	100	100	72	74
Relative price obtained by shifting ( $100 \div 158$ ) =				63

The relative price for June on the May base computed by averaging relative prices is 158. This quantity is supposed to give the percentage relation that June prices bear to May prices. It is desired to find what is the percentage of May prices to June prices. Using the usual method of dividing through by the relative price (158) of the period to be used as the new base, we get the following relatives: June, 100; May, 63. When we compare the money prices and calculate the firm relative prices and average them we get 74, as shown above.

The relative price computed from the original price quotations is more than 17 per cent greater than the relative price obtained by shifting the base in the manner described above.

It must not be forgotten that the figures used are actual prices returned to the Bureau by all the identical dealers reporting from *one* city. This is not a case cooked up for the purpose of showing a theoretical possibility that contains no element of probability. I

chose potatoes deliberately because their prices behaved so oddly at just this period when new potatoes are coming in and old potatoes are going out. The example given is extreme, but it is by no means unusual, and such capricious fluctuations are repeated every year for potatoes, and to a lesser extent for eggs and some other commodities that are subject to rather violent price changes. No doubt, more startling examples could have been found by a very little search. These examples are cited to show typical price changes in a commodity that fluctuates capriciously in price, not to exhibit the most extreme cases of such capriciousness.

The relative price computed from aggregate actual prices can be shifted at will to any base without error. This is evident when we consider the nature of such a relative price. The June relative price computed on the May base as 100 is  $\frac{\$1.76}{1.27}$ . Shifting this series to the June base by dividing by the June relative price gives the following: May relative price,  $\frac{\$1.27}{1.76}$ ; June relative price, 100.

Individual commodity relative prices can thus be shifted to the base price of any period desired without error because the relative prices are simple ratios of actual aggregate prices. Dividing through by the relative price of any year or period merely has the effect of substituting the aggregate actual price for the base period as divisor in the formula for computing the relative price.

By the old method of computation, errors in price data were not only perpetuated but cumulated by means of the vicious method of averaging, to the fourth and fifth degree, averages of relatives calculated from different prices as bases and by the still more unallowable process of shifting every month the base of the relative prices, which could not be done without subjecting the relative prices to grave suspicion as a dependable means of representing accurately what was happening to prices. These inaccuracies, taken with the inflexibility of relative prices and indexes calculated by averaging relatives, made the changes in methods of calculation which have been carried out imperatively necessary.

W. C. MITCHELL: Professor Willcox remarked incidentally that no man is in a position to criticise the statistical work done by the federal government unless he knows intimately the whole set of

processes by which the final results are obtained—how the original data are collected in the field; how they are tabulated, summarized and averaged in the office; and how the textual explanations of the tables are prepared. I concur heartily in the justice of this observation. By rights, it rules me out of the discussion. For despite three brief periods of employment by federal authorities—the Census Office, the Immigration Commission, and the Bureau of Labor Statistics—I have but a limited acquaintance with the production of federal statistics. It is as a consumer of statistics that I speak—primarily as a consumer of statistics of prices and wages—and I recognize that the consumer's impressions may be mistaken. However, I give them for what they are worth.

The field work of collecting data respecting prices and wages seems to me better on the whole than the office work of making these data into finished bulletins. For in the bulletins I have found much that is not clear, and not a little that is patently misleading or flatly wrong. But in so far as I have been able to test the original data I have found that they are consistent among themselves and consistent with similar figures compiled by other investigating authorities. In short, they seem to have been collected honestly and intelligently.

The reason for the relative inferiority of the office work appears to lie in the organization of the office force. The chiefs of the bureau which has done most work in this particular field have all been forceful and capable men. The clerical force has stood on a level rather above that common to government offices. But this bureau has lacked an adequate staff of skilled statisticians capable of understanding the purpose of an investigation, and of directing the work of the clerks under the general supervision of the chief, of making the most intelligent use of the data collected by the field agents, and of preparing lucid text which tells what the tables mean. It goes without saying that the head of a bureau cannot give personal supervision to all the many tasks imposed upon his office; and if he has not assistants who are really capable investigators trained in the use of statistics, much of the work turned out will be mediocre in quality.

The weakness of the organization in this respect arises from the fact that the bureau concerned can not offer a satisfactory career to capable men. Adequate salaries can not be paid, adequate recognition can not be given. A few men of the quality required have stayed by the bureau year after year, and worked

efficiently under most discouraging circumstances. These individuals merit more honor than they will ever receive for the sacrifices they have made and the service they have rendered. But their number is by no means adequate. The efficiency of a government bureau cannot be maintained indefinitely by exploiting the statistical enthusiasm or the patriotic philanthropy of its staff.

If I am right about the chief cause of weakness in the statistical work done by the government, the remedy lies in the hands of Congress. What we may do as individuals to aid the heads of the statistical bureaus in securing adequate appropriations for their staffs is not much, but it is better than nothing. By using the statistics which are already being published, we can show that there is a public demand for work of this character. By using this material critically, we can show that there is need of improving the product now supplied. By seeking to put the blame for such faults as now exist upon the proper shoulders, we may perhaps bring home to some members of Congress the necessity of making better provision for the support of statistical work. If we can accomplish something in this direction as individuals, we can as members of the American Statistical and American Economic Associations probably accomplish more. Accordingly, I endorse heartily the plan of coöperative effort which has been outlined by Professor Willcox. But I anticipate that his committee will find that the measures of greatest practical promise for improving the statistical work now done by the government lie along the line which I have suggested.

W. S. GIFFORD: I wish to speak on the subject of Some Present Statistical Needs and the Statistical Work of the Federal Government. I mention *present* statistical needs, merely to remind you that it is not only possibly but probably a fact that the statistical needs of today differ somewhat from those of a not far-distant yesterday.

My time is too limited to bring evidence to prove this point, but the story of changed conditions of industry and the growth of large undertakings in business and social fields, with the resulting increased necessity for up-to-date statistics, has been so often told that it does not need repeating. The Federal Reserve Board, the new federal Trade Commission and the United States Commission on Industrial Relations are instances of new federal bodies that will have to rely largely upon statistics in their work.

The private organizations and societies and large business undertakings which must so rely are becoming almost innumerable. These recent developments mean that the field of the economist and the statistician has been extended, and that work somewhat similar to that previously done by the academic economist or statistician is now being done as a practical every-day affair by men by no means exclusively specialists in economics or statistics.

How then does the present statistical work of the federal government meet these rather new requirements? As in the past we still have the academic requirements and the needs of the specialist and student. That the statistical work of the federal government largely meets these needs, there seems to be little or no question. In fact, it cannot be said to fall far short of meeting the newer needs that are referred to, but, in the course of actual practice, some of these newer needs stand out as so important that, if they could be met a little more fully than at present, it would be a valuable help to all concerned.

In the first place, when information on a given subject is desired, it is essential to know promptly and without too much specialized knowledge of all possible sources, just what is already available, just how much along the lines in question has already been done. Otherwise much time and expense may be wasted in duplicating information already collected or, what is still more serious, important decisions may be made more or less by guess, which decisions might have been based on facts already compiled. To find out what the federal government with its many departments and diversified interests has to supply in the way of statistics is, at present, to the ordinary busy man a complicated and difficult task. This statement may seem strange to the specialist who has become thoroughly acquainted with the duties and work of the federal government and with the various sources of information regarding that work, for there are at present many diversified sources of information as to the statistical work being done by the government.

What I plead for, however, is a subject index which could be published from time to time, furnishing a convenient source of information for all the statistical data available in the various departments of the federal government. This should, of course, be kept up-to-date by, say, monthly bulletins and periodical revisions of the complete index.



I cannot pass this thought by without suggesting that a subject index of statistical information available not only in the federal government but state, municipal and private fields, although it would be a colossal undertaking, would in its results more than justify its expense.

As I said before, many people today use statistical information who are not students or specialists. Now this idea presents another need. These are busy people in their particular work, whatever it may be; they look in a document for certain figures and they do not always read the text which explains those figures. It is, therefore, important to prevent serious mistakes that all tabular statements of figures should be self-explanatory; that is, the limits of the use of the figures in the table should be shown by either the heading of the table or a footnote. If absolutely necessary, the footnote could refer to certain pages of the text with a statement that the figures should not be used for any purposes without first having read the text.

Again, the question of speed is important, for figures become less valuable for many purposes in direct proportion to the remoteness of the date of which they are representative. Tables first with only the essential text, issued promptly, and analytical analyses issued later might well be the standard method.

Lastly, I would say a word about the adaptation of the kind of statistics prepared to the kind of statistics needed. Anything which can be done to further improve the direct relation between the men who use the statistics and the government department which collects them would be decidedly worth while. We are discovering every day that we want statistics of a sort which we have not yet gathered. It is, furthermore, possible that we are gathering statistics of a sort which we no longer need. If there were formed a standing committee or, better still, an official commission of some sort, with representatives of such associations as the American Economic Association and the American Statistical Association, together with, let us say, the American Bankers Association, the United States Chamber of Commerce, etc., and representatives of the government statistical departments, it would be to the advantage of us all. It would provide a definite opportunity for us to present such statistical needs as our own individual experience develops, to a body which would be able to take some practical action in the matter.

It is a fact that a great deal has been done and is being done along these various lines, but perhaps still more can be done to hasten them along to a satisfactory conclusion. There can be no question as to the need of having them ultimately worked out.

Briefly, then, present statistical needs require of the federal government:

1. A subject index of all statistical data available.
2. Statistical tables that are self-explanatory.
3. Greatest practical speed.
4. Some organization, composed of government and private individuals to assist in adapting the kind of statistics gathered to the kind of statistics needed.

HARVEY S. CHASE: The subject which I wish to discuss is Uniform International Financial Statements. In order to comply closely with the excellent rule of your managing committee which restricts the time allowed to each speaker at this discussion, I must present at once certain conclusions which I have reached upon this topic and leave the explanations for another time.

The suggestion embodied in my subject came to me from Dr. S. N. D. North of the Carnegie Endowment for International Peace and I have been permitted by Dr. North to see the correspondence with officials of the International Statistical Institute, whose permanent headquarters are at the Hague and whose last international meeting was held at Vienna in August, 1913. This correspondence has in view a possible working coöperation between the Carnegie Endowment, and a Committee of the International Statistical Institute, or other eminent statisticians, for the purpose of developing a plan for the compilation of uniform international financial statistics; in other words, to establish what the world has long needed, a basis for an international budget.

The Institute officials, particularly Dr. Zahn of Munich, have been interested for years—even so far back as 1853—in questions relating to standard schedules for uniform financial statements by all nations. Much hard work and profound thinking have been done by Dr. Zahn and others upon *pro forma* drafts for such schedules.

It is evident, however, to me, after some fifteen years' experience in establishing uniform financial statements for municipalities, for states, and for the national government, that these preliminary drafts have been somewhat too ambitious, much too extended

and detailed, for the immediate practical purpose. It seems to me that it is necessary, if results are to be attained which will justify the labor and expense involved, that attention shall be concentrated at first upon relatively *few* fundamental classifications, leaving others—even the finer details of these fundamental classes—to be worked out later in the natural course of development. By this I mean that if we wait for a perfect theoretical system to be devised, including all the detailed subdivisions necessary to embrace the requirements for every nation, we shall—owing to the magnitude and the diversity of purposes, methods, and accounts of the various nations—postpone for years the beginning and final accomplishment of our desire, namely: to obtain comparisons of governmental costs in those nations.

On the contrary, if we are content to exhibit only large, fundamental functions in our first classification, we may reach important results almost immediately, and thereafter we may subdivide and reclassify these results according to the increase of our knowledge of the facts and as the awakening interest of the statisticians of the nations shall provide.

This course was the one pursued in municipal affairs in this country. First, in 1899, one city—Newton, in Massachusetts—adopted the so-called Uniform Classification of Municipal Expenditures which had been prepared by a committee of the National Municipal League. As soon as the annual report of that city was published and it became evident that even *one* city had adopted the classification, the latter took on a practical character. Other cities adopted it of their own motion or under supervision of the League's committee, and within two years a whole state, Ohio, had applied it to all her cities, eighty in number. Then New York adopted it in somewhat improved form and Massachusetts followed, applying the uniform classification to all her cities and to all her towns so far as their annual reports to the commonwealth were concerned. The United States Census—Division of Wealth, Debt and Taxation—took it up and soon there was developed an actual, workable, uniform classification of municipal expenditures and revenues which was applicable to any and to all cities throughout the country.

Now, prior to the practical application in Newton, the National Municipal League had been debating the form of standard classification for some years, without results, for the reason that no two people could agree, or can agree, upon all of the elements of any

# EXHIBIT OF THE EXPENDITURE SIDE OF THE NATIONAL BUDGET

Prepared by Harvey S. Chase, C. P. A., from the "Estimates" submitted to Congress by the Departments and Offices for the Current Fiscal Year ending June 30, 1915, and the New Fiscal Year ending June 30, 1916. Classified by Purposes of Expenditure (Functions of Government).

## GENERAL SUMMARY, TOTAL ESTIMATES

	Fiscal Year 1914-15		Fiscal Year 1915-16	
	Operation and Maintenance Expenses.	Construction and Improvement Outlays.	Operation and Maintenance Expenses.	Construction and Improvement Outlays.
Totals for War Functions (National Defense excluding "sinking-fund" estimates.....	\$409,286,834	\$56,895,356	\$397,204,573	61,867,230
Totals for Peace Functions (Social & Economic) excluding "Postal" and "sinking-fund" estimates..	110,074,651	79,239,444	123,651,137	72,655,130
Totals for Postal Service.....	308,803,117	308,803,117	299,175,859	299,175,859
Totals for General Governmental Functions.....	61,839,638	6,698,084	59,760,946	2,413,025
Totals for Local Governmental Functions.....	11,547,132	3,580,321	10,751,495	2,572,739
Grand Totals, all purposes, except "sinking-fund"	901,551,372	146,413,405	890,544,010	139,508,124
"Sinking-Fund" estimates, having no validity....	60,717,000		60,723,000	
Grand Totals, per "Book of Estimates".....	\$962,268,372	\$146,413,405	\$951,267,010	\$139,508,124
				\$1,090,775,134

## A. EXPENDITURES FOR "WAR" OR NATIONAL DEFENSE FUNCTIONS

### Army, Navy, War Pensions, War Debts

#### Estimates for Costs of Present-day National Defense

Current Charges. Annual Appropriations. (1)			
Defense by land (Military).....	\$100,249,712	\$14,379,198	\$114,628,910
Administration: Secretary of War.....	148,040		148,040
Adjutant-General's Office.....	730,570		730,570
Quartermaster Corps.....	378,670		378,670
Engineers and Insular affairs.....	208,581		208,581
Other offices, War Dept. ....	456,598		456,598
	\$98,447,100	\$15,943,824	\$109,390,924
	146,440		146,440
	724,870		724,870
	376,620		376,620
	206,290		206,290
	453,878		453,878

Defense by sea (Naval) .....	98,311,306	42,490,734	140,802,040	96,558,480	45,332,801	141,891,281
Administration: Secretary of the Navy .....	76,460		76,460	83,580		83,580
Bureaus: Navigation, Intelligence, Records .....	108,790		108,790	110,790		110,790
Bureaus: Engineering, Repairs, Yards and Docks ..	106,430		106,430	128,430		128,430
Bureaus: Supplies, Accounts and other offices .....	304,660		304,660	273,740		273,740
Operation and maintenance (2/3) of the State, War and Navy Building (2) .....	188,013	2,000	190,013	105,227	8,000	113,227
Totals for current national defense .....	201,267,830	56,871,932	258,139,762	192,615,445	61,284,625	253,900,070
Estimates for Costs at Present of Previous Wars <i>Current Charges. Annual Appropriations</i>						
War pensions, retirements, veterans' homes, etc....	186,674,527	23,424	186,697,951	183,419,651	582,605	184,002,256
Totals for current national defense .....	387,942,357	56,895,356	444,837,713	376,035,096	61,867,230	437,902,326
<i>Fixed Charges. Permanent Appropriations. (1)</i>						
Interest on war debts .....	13,000,000		13,000,000	13,000,000		13,000,000
Sinking-fund provisions for war debts (3) .....	37,000,000		37,000,000	37,000,000		37,000,000
Trust funds, established by war requirements .....	2,770,000		2,770,000	2,730,000		2,730,000
Special funds and accts. for war purposes .....	5,574,477		5,574,477	5,439,477		5,439,477
<i>Grand Total for War Functions .....</i>	446,286,834	56,895,356	503,182,190	434,204,573	61,867,230	496,071,803
Deduct "sinking-fund" (3) .....	37,000,000		37,000,000	37,000,000		37,000,000
<b>Total estimates for actual War Functions .....</b>	<b>\$409,286,834</b>	<b>\$56,895,356</b>	<b>\$466,182,190</b>	<b>\$397,204,573</b>	<b>\$61,867,230</b>	<b>\$459,071,803</b>

#### FOOTNOTES

(1) These terms "annual" and "permanent" might be better stated "current" and "recurrent," as all appropriations are enacted annually by Congress, even though the amount is not fixed (indefinite), or the time is not fixed (indeterminate).

(2) Operation and maintenance expenses of office buildings, rents, etc., are mainly included in item in "operation and maintenance of public buildings" General Governmental Purposes, because these expenses cannot be separated, under present methods of bookkeeping.

(3) Sinking-fund provisions are negligible; merely bookkeeping items having no actual existence. There are no securities and no cash in the so-called "sinking fund."

(4) See also additional estimates under "permanent appropriations."

(5) Including Bureau of Naturalization, \$250,000 in 1914-15, and \$307,950 in 1915-16.

(6) This amount should be distributed in detail to the various departments and divisions.

(7) Approximately one half of this is offset by District of Columbia revenues.

(8) Panama Canal is included in "Peace" estimates although a good case can be made out for including it, or a large portion of its cost, under "War" estimates. In 1915-16, however, certain fortification estimates are included under "War Functions."

# B. EXPENDITURES FOR "PEACE": CIVIL, SOCIAL, AND ECONOMIC FUNCTIONS

## State, Interior, Agriculture, Commerce, Labor, Etc.

<i>Current Charges. Annual Appropriations. (1)</i>	<b>Fiscal Year 1914-15</b>			<b>Fiscal Year 1915-16</b>		
	Operation and Maintenance Expenses.	Construction and Improvement Outlays.	Total Estimated Expenditures.	Operation and Maintenance Expenses.	Construction and Improvement Outlays.	Total Estimated Expenditures.
I. Natural Resources, Agriculture, Etc.	8,951,617	47,500	8,999,117	10,562,555	6,750	10,569,305
1. Promotion of agriculture (4) .....	2,284,520		2,284,520	2,345,230	3,000	2,348,230
2. Promotion of mining, topography, regulation of water power, etc. ....	5,390,741	477,590	5,868,331	5,386,256	467,000	5,853,256
3. Promotion of forestry.....	1,155,730	255,900	1,411,630	1,096,084	203,400	1,299,484
4. Promotion of fisheries.....	3,184,920	10,000	3,194,920	3,098,924		3,098,924
5. Care and utilization of public lands.....	1,667,270	3,000	1,670,270	1,703,750		1,703,750
6. Meteorological research, weather bureau, etc....	1,709,720		1,709,720	4,942,540		4,942,540
7. Statistical research, census, etc. ....						
II. Commerce, Banking, Etc.	5,862,452		5,862,452	6,213,874		6,213,874
1. Regulation of currency, coinage, etc. ....	3,378,305		3,378,305	3,406,585		3,406,585
2. Promotion and regulation of commerce.....	837,175	395,000	1,232,175	781,355	256,000	1,037,355
3. Regulation of Standards of measurement, etc..						
4. Promotion of transportation: (4)	3,197,815	38,286,080	41,483,895	7,721,435	45,665,788	53,387,223
Improvements of rivers and harbors.....						
Lighthouses, life saving, roads, surveys, engi- neering, etc. ....	12,484,004	2,679,700	15,163,704	12,509,057	2,454,000	14,963,057
Panama Canal (8) .....	1,546,395	22,228,760	23,775,155	6,429,197	10,512,440	16,941,637
5. Regulation of banking.....	194,240		194,240	216,740		216,740
6. Regulation of patents and copyrights.....	1,626,300		1,626,300	1,584,050		1,584,050
III. Welfare, Labor, Etc.	4,087,062	104,700	4,191,762	4,425,188		4,425,188
1. Promotion of public health (4).....	1,349,376	1,271,014	2,620,390	1,345,792	953,708	2,299,500
2. Promotion of education and recreation (4)....						
3. Promotion of the welfare of the laboring classes and regulation of labor (5).....	4,068,250	812,200	4,880,450	3,986,150	392,000	4,368,150
4. Provisions for Indians and wards of the Nation (4)	9,295,715	1,635,400	10,931,115	9,449,013	706,000	10,155,013
5. Provisions for defectives, dependents, etc. ....	1,565,349	455,000	2,020,349	1,466,356	3,000	1,469,356
IV. Foreign Affairs	3,920,970	477,000	4,397,970	4,539,766	23,044	4,562,810
Foreign affairs and relations (4).....						
V. Departmental Administration	354,060		354,060	378,580		378,580
1. Administration; Dep't of State.....	634,040		634,040	635,850		635,850
2. " " " Interior.....	765,988		765,988	896,287		896,287
3. " " " Agriculture .....	252,160		252,160	300,220		300,220
4. " " " Commerce .....	183,040		183,040	165,060		165,060
5. " " " Labor .....						
6. Operation and maintenance, (1/3) State, War and Navy Building (2).....	94,007	1,000	95,007	52,613	4,000	56,613
	80,241,221	69,139,844	149,381,065	95,038,407	61,640,130	156,678,537



### C. EXPENDITURES FOR POSTAL SERVICE FUNCTIONS

	Fiscal Year 1914-15		Fiscal Year 1915-1916	
	Operation and Maintenance Expenses.	Construction and Improvement Outlays.	Operation and Maintenance Expenses.	Construction and Improvement Outlays.
<b>Estimates for Postal Service</b>				
1. Postal service, payable from postal revenues....	306,953,117		297,355,164	297,355,164
2. Administration of Postmaster-General's Dept....	1,850,000		1,820,695	1,820,695
3. Operation and maintenance of post offices, etc (2)				
<b>Totals for Postal Service (2) .....</b>	<u>308,803,117</u>	<u>308,803,117</u>	<u>299,175,859</u>	<u>299,175,859</u>

### D. EXPENDITURES FOR GENERAL GOVERNMENTAL FUNCTIONS

Covering requirements both for purposes of war and for purposes of peace

#### Legislative, Executive, Judicial, Etc.

##### *Current Charges, Annual Appropriations (1)*

##### I. Legislative:

The United States Senate..... 1,849,287  
The House of Representatives..... 4,956,985

##### II. Executive:

The President, Vice President and the executive offices..... 210,440  
Civil Service Commission..... 450,165  
Collection of the revenues, etc.—Treasury... 17,247,650  
General accounting and auditing—Treasury. 1,752,080  
Operation and maintenance of public buildings and grounds (2) ..... 8,098,412  
Construction and improvement of buildings and grounds ..... 6,302,584  
Public printing, all departments (6) ..... 5,892,408  
General Supply Committee..... 65,640  
Reference and library purposes..... 465,585  
Distribution of documents..... 318,275  
Administration of Treasury Dept. .... 1,890,770  
Administration of Dept. of Justice..... 777,711  
Detection of crimes, legal advice, etc.(Justice) 2,694,620

	8,500	1,857,787	1,858,217	5,000	1,863,217
		4,956,985	5,020,977		5,020,977
	5,000	210,440	211,840		211,840
		450,165	466,085		466,085
	125,000	17,372,650	17,034,460	50,000	17,084,460
		1,752,080	1,765,930		1,765,930
		8,098,412	7,345,354		7,345,354
	6,302,584	6,302,584	2,130,525	2,130,525	2,130,525
	130,000	6,022,408	100,000	5,000	5,100,985
		65,640			42,090
	127,000	592,585	127,500		482,240
		318,275			329,765
		1,890,770			1,796,520
		777,711			622,143
		2,694,620			2,592,560



### III. Judicial:

The Supreme Court and other courts.....	6,299,110	6,299,110	6,453,380	6,453,380
<i>Fixed charges. Permanent Appropriations (1)...</i>				
Revenue refunds, drawbacks, etc. ....	8,470,000	8,470,000	8,490,500	8,490,500
Retired judges, Hawaiian judges, etc. ....	175,500	175,500	175,500	175,500
Revenue Collection, night services.....	225,000	225,000	200,000	200,000
<b>Totals for General Governmental Functions</b>	<u>61,839,638</u>	<u>6,698,084</u>	<u>59,760,946</u>	<u>2,413,025</u>
				<u>62,173,971</u>

### E. EXPENDITURES FOR LOCAL GOVERNMENTAL FUNCTIONS

Territorial Governments.....	304,638	304,638	233,800	233,800
Philippine customs and internal revenue.....	321,000	321,000	181,000	181,000
District of Columbia (7).....	10,911,094	3,580,521	10,336,695	2,572,739
Militia, industrial schools, etc. ....	10,400	10,400		12,909,434
<b>Totals for Local Governmental Functions</b>	<u>\$11,547,132</u>	<u>\$3,580,521</u>	<u>\$10,751,495</u>	<u>\$2,572,739</u>
				<u>\$13,324,234</u>

detailed classification. Some will favor one location and some another location for the same function or item. The disagreements are without end, the disputants seldom if ever reach a conclusion upon these theoretical details. For example, if we had not immediately tried out the classification at Newton, just as it was, in 1899, it is possible that the various contestants would be discussing yet, whether Hospitals should be associated with Charitable Institutions or with Conservation of Health and whether cemeteries should be classed as Sanitary Measures or as Public Utilities. Therefore the important thing is to get the movement started *in practice* on a simple but fundamental classification, which can be agreed upon promptly by a majority of those who have expert knowledge of the subject.

What appeals to me concerning the present matter-in-hand is this, that a committee of the Statistical Association or of the Economic Association or, better, of both combined, should be appointed. Not too large a committee, but one whose members can meet conveniently and regularly and thereby accomplish definite results within a relatively short time. This committee should adopt, after proper discussion, a preliminary classification of national functions with such subdivisions as may be deemed practicable, and then the new budget of the United States of America for 1915-16 should be drawn up by the committee and published in accordance with these classifications at the earliest possible moment—not a year or two hence but right off now, within two months or three at the outside. Then, the practicability of the classification having been established through adjustments made during this experience, the published results should be spread broadcast in this country and abroad for criticism, suggestion, and imitation. The committee, also, should be authorized to consult and coöperate with foreign committees, which have been, or may be, appointed for the same purpose.

Now, what are the fundamental functions common to all, or nearly all, the nations? Evidently—we have the proof before us—war or national defense is one of them; the most important single function of them apparently. What is another? Evidently national indebtedness is another. This includes debts, sinking funds, interest, all matters relating to national debts, funded or floating. Again, national administration is universal in some form. The functions of legislation, execution (administrative), and judicature are everywhere present. They can be classified without

serious difficulty; by this I mean the higher administration, the "overhead" costs of national government.

So far we have mentioned three large, fundamental functions, each capable of simple subdivisions of uniform and standard character. With these three we shall have covered much more than half, probably three quarters, or even more, of the total costs of each national government. We may well be satisfied with these three if it should prove impracticable to advance farther this year. I am convinced, however, that we shall find that we can advance quite a little farther almost immediately. For instance, there are the "public service" or "public utility" functions, such as railroads, telegraphs, telephones, mail service, and express service. Also there is "forest service," and "agriculture," as well as "commerce," and various other functions which can be classified, in big subdivisions at least, and which will be fairly comparable among the nations. Soon, however, we should get into serious difficulties and would be obliged to stop, for the present.

"To stop" reminds me that my time is expiring and therefore I desire to suggest to you the advisability of the appointment of a joint committee, such as has been outlined, to consist of, say, six persons, one half from each Association. This committee should be instructed to take hold immediately of our subject and prepare the fundamental classifications promptly. If such a committee does its work effectively, the results should be of great importance and the work should be a means of gratification to the members of both of your learned bodies in the future.

ROGER W. BABSON: As Mr. Chase has so ably suggested, some of us are much interested in certain plans for standardizing and jointly publishing certain international statistics for which statesmen and business men are so much in need. We further believe that the development of the statistical work of the United States government has reached a point where to longer go ahead without regard to what other nations are doing will mean a lot of undoing later.

In view of the fact that President Koren has given me a place upon this program to tell about this work, I feel that the least I can do is to reciprocate by basing the first half of my remarks upon a most able paper upon the subject which he read last year in New York. Our argument in brief is as follows:

For years it has been the hope of statesmen and economists, as well as of statisticians, that the censuses of the principal countries of the world might become so standardized that it will be possible to make accurate comparative studies of the true growth and relative prosperity of the respective nations. It has not been contemplated that the national censuses should follow the same pattern in all details, but that they should deal with specified subjects in a certain uniform manner, such subjects to be chosen as will afford a fact-basis for determining the economic and social standing and development of each nation.

The possible utility of a world standard of values as applied to nations is infinite. The interdependence of nations in things that make for prosperity and general well-being is daily becoming more obvious. Back of much of the insecurity and strife in international commerce and industry, back of the halting way in which we endeavor to meet common social problems, back of the international jealousies and suspicions that always threaten, lurks ignorance of national and international conditions and relations. It is the ability to strike a reliable balance sheet that has made possible the huge systems of combinations in commerce and banking. Is not the use of a balance sheet equally urgent in the affairs of nations if they are to be directed for the common good of all?

Of the many by-products to be derived from standardizing knowledge in the manner indicated, how it will point to opportunities in business, prevent losses through foreign investments and commercial dealings; how it may help to a better distribution of population, as well as of products of agriculture and industry; how it may reveal fundamentals in educational systems that make for real prosperity, there is no time to speak.

The idea of a standard international census has had many advocates within bodies like the International Statistical Institute, and the International Institute of Agriculture at Rome. Recently, at various gatherings here and abroad and through publications, the idea has won new momentum. Everywhere it meets hearty approval. Boards of trade, producers and bankers, no less than statisticians, economists, and peace advocates, readily see its wide bearings.

Of course, such a development in statistics will not be brought about at once. One feature at a time, however, can be taken up and a beginning made very soon. Mr. Harvey Chase has already admirably shown the need of standardizing the budgets of the leading nations, and other members of our societies have at times pleaded for conformity in other statistical work. One specific illustration is the work being done by Professor Irving Fisher of Yale, for standardizing the commodity prices indices of the differ-

ent nations. Very important fiscal, industrial, and social movements are absolutely held up for lack of scientific and comparable figures on the cost of living.

Mr. Meeker has referred this morning to the great work which he is doing toward "setting our own house in order"—and yet he is being forced to do this independent of any help from other nations, which makes it almost certain that some day it must all be done over again. The same condition of affairs exists in connection with our figures on exports, imports, and a host of other subjects. Every conscientious governmental official is up against this same problem as is Mr. Meeker, while the bankers, manufacturers, and merchants of the country are all at sea.

But some say: Why trouble about so-called international statistics until we get better national statistics? Why try to standardize the statistics of the world until we standardize those of our own country? Why attempt to make England, Germany, and the other great nations conform to the same methods of compilation until we get California, Illinois, and Massachusetts to agree? At first thought these questions seem reasonable, but there are good answers to them all. First, the very time to standardize such statistics is before they are "perfected" in the different countries. The more incomplete they are, the easier it will be to induce the different nations to adopt the standardized forms. The longer the change is delayed, the more difficult it will be to get them to make the much desired changes. Secondly, it would be very much easier to perfect the compilation and methods used by the different states of our own country if we had some international standard to refer to. California may not want to change her system to please Massachusetts, nor to copy a standard set by Illinois, but she could be much more readily induced to adopt some international standard prescribed by an international commission.

Members of the American Statistical Association and members of the American Economic Association: this seems like a large order, but the statistical work of the United States government, to be of real value, depends upon the placing and the filling of such an order.

But since our last meeting something has happened which may help very much in this development. I refer to the great European war, which may result in some sort of a commercial alliance that will assure equal protection to the commerce and markets of all nations.

The Hague Tribunal, which has been the work of pacifists and jurists, has signally failed. We have learned that little progress can be made for world peace through sentimental plans for arbitration. We see in the newspapers of the past few days, however, the beginning of another great movement under commercial and shipping interests, which appears very hopeful. This movement, moreover, is even being officially endorsed by the diplomats of our sister republics at the south, and I might add that I leave in two weeks for Chile and Argentina in connection with this work. In fact the "Neutrality Commission of Nine," recently appointed by the Pan-American Union is a most hopeful sign that a commercial alliance may be formed which will make another such war very improbable.

If the leading nations come together in a commercial alliance to neutralize the seas, regulate trade-barriers, and assure all member nations equal commercial protection, that will be the beginning of a great development in international statistics. It will lead to standardizing the censuses and all the vital, commercial, and industrial statistics of the different nations. As the development of the simplest form of national government was dependent on collecting statistics for proportioning representation, taxation, etc., so the development of any international alliance or federation will carry with it the extension and standardization of international statistics.

Did you ever think that political revolutions exist today as in the past, except that we make armed fighting unnecessary? Every four years, before there is a chance for an armed conflict, we count the conflicting parties and if we see that one side has enough more males to win than the other we call them the victors, as the result of such a count. In other words we let both sides fight, but insist that they fight statistically with ballots, instead of in a mediaeval fashion with bullets. Hence I believe that not only will this new international movement bring about the much hoped development of international statistics, but that the wars of the future may be fought with statistics and ballots instead of with guns and bullets. Certainly it must be with one of these two classes of weapons, as the world can never remain *in status quo* as the pacifists so supinely hope. In view of this possible development I conclude as follows:

1. That, granted the existence of certain glaring needs to which President Koren, and Messrs. Willcox, Meeker, Mitchell,

Durand, and Gifford have so ably referred, the statistical work of the United States government has now reached a point where it should at once seek to coöperate with other governments in standardizing the census and statistical work of all nations.

2. That this means the formation of some sort of official international census office entirely apart from the able work of the International Statistical Institute at the Hague.

3. That the duty of the American Statistical Association, the second oldest statistical association in the world and the only one of any consequence in a now neutral nation, is to call an international conference to consider this project.

4. And finally that in the meantime we individual members work and talk in favor of this proposed commercial alliance and the neutrality plan of our South American brothers, for, if these are successful, international and national statistics will be put on a plane higher than we have even yet dared to hope for.

JOHN CUMMINGS: Members of the Associations may be interested in an instance of coöperative statistical work in which the coöperating agencies included two federal bureaus, two private associations or foundations, and a local public agency,—these being the coöperating agencies in a recently completed survey of industries and schools in the city of Richmond, Virginia. The report of this survey will shortly issue as an official publication of the federal government. Specifically the coöperating agencies in this work were the following:

1. The National Society for the Promotion of Industrial Education, which was active in organizing the survey, and assumed certain expenses for printing bulletins bearing upon the work, and for services of its office force. This society has just recently, some three weeks since (Dec. 9-12, 1914), held its annual convention in Richmond, practically the entire time of the convention being devoted to a consideration of the results of the survey, and to the formulation of recommendations based upon the findings. It may be noted, as an indication of the value of such work, that the superintendent of the Richmond schools stated to the convention that the survey had outlined a program of procedure in industrial education providing for the development in Richmond during the next ten years. Incidentally he stated that the survey had already saved the city \$250,000.

2. The second coöperating agency was the city of Richmond

itself, represented by the superintendent of schools and by a local committee of citizens. Richmond provided funds to cover the cost of making a survey of its industries.

3. The third coöperating agency was the Russell Sage Foundation of New York City, which through its educational director made the school survey, and assumed a large portion of the cost of the school survey.

4. The fourth coöperating agency was the United States Bureau of Education represented by its expert in industrial education, who assisted in the establishment of prevocational and vocational courses organized upon the basis of the survey findings and recommendations.

5. The fifth coöperating agency was the United States Bureau of Labor Statistics. This bureau's expert on industrial education was given six months' leave of absence to enable him to serve as director of the industrial survey. The Bureau of Labor Statistics, also, is to issue the full report of the findings and recommendations, which will probably run to 300 or more pages, and will include the four large text-charts, a few copies of which, by the courtesy of the Bureau, I have been permitted to bring to this meeting for distribution in case any members present care to have them. The Bureau by assuming the cost of printing these charts and the full report has made possible the publication of both the charts and the report in the proposed form. The chief editor of the Bureau, Mr. Verrill, has served upon the editorial committee of the survey, and through him and Commissioner Meeker the Bureau has coöperated to the full extent of its authority to do so.

Another department of the federal government may be mentioned as being implicated indirectly in the undertaking—the Department of Commerce,—since Secretary Redfield of that Department is President of the National Society for the Promotion of Industrial Education. The Commissioner of Labor and the Secretary of Commerce manifested their interest in the work by attending the convention held in Richmond to consider the findings of the survey, and by participating in the proceedings.

It may be of interest to note, also, since there has been some misunderstanding as regards the attitude of organized labor with reference to the institution of industrial education even in the public schools, that in the work of gathering the data the agents of the survey had the full coöperation of the local labor unions,



and that Mr. Gompers, President of the American Federation of Labor, also attended the convention in Richmond, and in an address heartily endorsed the proposed program.

The character of the data gathered relating to occupations may be inferred from the charts which present in parallel columns a statistical analysis of some fifty-six occupations in the printing, building, and metal trades and in the tobacco industry. Occupations in retail stores are included in the report, but have not been charted. The report contains also the full analysis of each occupation briefly summarized on the charts together with a very considerable amount of tabular matter and general text dealing with the industrial character of Richmond.

The data for the charts and for the tabulation were gathered upon schedules and through personal interviews with employers and employees.

The schedule inquiries related to such topics as hours, wages, seasonal fluctuation, age of entrance to trade, extent to which the trade could be learned in the shop, years required to learn the trade, age period of maximum productivity, source of labor supply, the demand for labor and whether the demand is increasing or decreasing in Richmond; the conditions of employment that involve physical or nervous strain, that stimulate or that narrow or restrict development, or are in other respects important as affecting the welfare of the worker; the requirements as regards general, trade, and technical education of the worker; the line of promotion in the shop; provision made in the shop for systematic instruction of apprentices and of journeymen; the common deficiencies of workers; what training the school ought to give the boy or girl before he or she enters the shop; what it ought to give for the apprentice and for the journeymen in the shop, by means of continuation classes,—and other facts of importance in constituting a statistical basis for organizing industrial education.

The charts summarize briefly a portion of the data gathered on these schedules and from other sources. In the case of each occupation shown, the analysis begins with a brief description of the nature of the occupation itself, and continues down the column covering the points which have been specified.

Consistently with the purpose of the industrial survey, that is, to provide a basis of statistical information relating to industrial

occupations in the city of Richmond upon which to base a system of industrial education in public schools,—and while the work was still in progress, courses were organized in response to requests coming from the workers themselves, for molders, plumbers, electricians, and for workers in other occupations.

It is assumed as a principle justifying such surveys that industrial education must be intimately related to specific local industrial needs—that it must be based upon data relating not to occupations in general, but to occupations as determined by the industrial development of the community in which that sort of education is undertaken—taking account, for example, of the extent to which processes and employments in the given community have been specialized. In the survey of Richmond's building trades some fifteen distinct occupations could be defined, but if the survey had been in New York City the number of distinct occupations in the building trades would have been very much greater. In Richmond the carpenter may have occasion infrequently to lay a parquet floor; in New York the parquet-floor layer may not be required even occasionally to do any other sort of work. In general the needs of Richmond as regards industrial education are local and peculiar, and industrial courses established in Richmond should, therefore, be unique, reflecting the industrial character of the community, and being modified and developed as the local industries change. In accordance with this principle the data upon which to base industrial education in any community must be gathered in the workshops of that community. This makes the basis of industrial education empirical and statistical. It makes the problem of industrial education essentially a local municipal problem. It assumes that no system of industrial education devised for one community is adapted to the needs of any other community.

If the problem of industrial education is so essentially local in character, what interest has the federal government in the character of Richmond's industrial education? The answer is, of course, obvious. No social problem is purely local, and while industrial education must, if it is to be efficient, be differentiated locally, it is, nevertheless, in the aggregate a national affair. The federal government representing the country as a whole in its industrial development and competition with foreign nations, is interested in the extension of practically efficient industrial

education as a national asset; just as Richmond in its industrial development, in competition with other cities, is interested in the development of practically efficient industrial education as a municipal asset.

Formal coöperation, such as has been outlined, between public and private agencies in the actual field work of statistical inquiry may seem somewhat inconsistent, not only with official dignity, but with the general principle that public agencies must not engage in private enterprises. This appearance of inconsistency arises from a failure to recognize that private associations may be engaged in work which is clearly affected with the public interest. Where this is the case coöperative participation of federal bureaus in rendering statistical service is entirely proper as a public function. The extent to which government bureaus can coöperate with private agencies in statistical work is obviously limited to such enterprises as are clearly affected with the public interest, and in general the possibility of coöperation is determined by the character of the private agencies.

The number of responsible, permanent private foundations and associations which represent important social interests is very considerable and is increasing. These private organizations have arisen in response to recognized social needs. Immigrants stranded in our large cities, for example, constitute a social problem, and a league for the protection of immigrants is organized. The need for industrial education becomes pressing and a society for the promotion of industrial education is organized. Conservation of soil, water-power, and forests is the basis of private association. In a word every important social need is bound sooner or later to become the basis of organization. Such organizations are national in character. They represent national interests and, when the purposes of these organizations are consistent with the public interest, coöperative participation by bureaus of the federal government in the work which they are doing would seem to be a natural procedure.

Incidentally it may be noted that the difficulties in the way of such coöperation are in some respects less considerable than in the case of public agencies. Public agencies, state or municipal, are essentially local—essentially not national in character. Every public agency has its geographic field of operation defined in ordinances and statutes. Such agencies, moreover, operate under a

rigid legal definition of powers and functions, which in many instances constitutes a barrier to effective coöperation.

In the case of private agencies there is no rigidity of legal status to be broken down. It may be noted, further, as a justification for coöperation with private agencies that they, more frequently than public agencies, represent specific social problems national in scope,—that they represent live interests which have developed in the community,—that they represent what the community is thinking about; whereas the public agency or bureau represents a traditional interest as defined in more or less permanent statutes and ordinances. The private agency may infuse inspiration and motive into official routine.

The advantages of coöperation in the instance which has been noted will be obvious, and it will, I think, be clear that equally great advantages may result from similar coöperation in other lines of work where permanent responsible private agencies are in the field.

All of the work on the Richmond survey was done under the direction of professional experts, who prepared the schedules and supervised the field work and the tabulation of the data. Such work, if it is to be of value, must be done by professionals, and it will be obvious that cities generally cannot maintain corps of experts for this work, since in the nature of the case the work is not as regards any single city continuous.

This is the condition which perhaps more than any other makes coöperation of the federal government essential. A municipality undertaking such work independently may find it necessary to depend upon inexperienced service. Without coöperation, each survey is experimental and the data gathered relating to occupations and industries in different cities acting independently are bound to be of varying value and character.

As regards the country as a whole, however, assuming that cities generally undertake such surveys, the work is continuous, and bureaus of the federal government can, therefore, organize on a permanent basis for the promotion of such undertakings.

While the statistical analysis of occupations undertaken in Richmond was undertaken for the specific purpose of providing a basis of industrial education in that city, the data gathered are of general economic significance, being such as must, to a greater or less extent, underlie economic speculation regarding industrial

conditions and employments. The significance of the data will obviously increase in proportion as the number of cities covered increases, and in proportion as the work is organized and conducted in accordance with some uniform scheme. Coöperation of the federal bureaus would seem to be an obvious way of securing this uniformity in method and data.

Finally, it is of importance that the schedules used in such work shall be subjected to scientific criticism and that they shall be perfected so as to get the data which are of economic value. The Richmond survey is the first of its kind, and necessarily in this respect experimental. It is intended to serve as a type survey, but even while the work was in progress, those engaged in the work realized that improvements could be made in the methods and in the schedules, and when the report issues from the Bureau of Labor Statistics, it is to be hoped that criticisms will be freely forthcoming from those interested to secure accurate data regarding the common industrial pursuits of wage earners.

JOSEPH A. HILL: I think that the movement initiated by the appointment of these committees on the statistical work of the federal government, if it is to have practical results, ought to lead to the institution of a federal statistical commission established by act of Congress, and having authority to investigate the statistical activities carried on by the different government bureaus and to make recommendations with a view to the better organization and coördination of the work and the improvement of the product.

The statistical work of the United States government has grown up in a more or less haphazard way. It is not improbable, therefore, that an undue amount of time and money is being expended on some statistical lines and not enough on others, and that some statistical inquiries might with advantage be curtailed and others expanded, or some dropped altogether and new ones initiated.

It is not merely a question of whether each inquiry considered by itself is worth while, but a question of what is best worth while. It is the relative value of the different lines of work which must be considered. It is the question of efficiency, or of using to the best advantage the limited amount which the country as represented by Congress is willing to expend on statistical work.

An investigation of this kind will take time; to be of any value it must be thorough, extending even to the detailed questions on the schedules, and must be conducted by competent men who should be compensated for their labors.

I think that the societies here represented ought not to rest content with merely passing resolutions and making recommendations. They ought ultimately and after due deliberation to draw up the bill for the institution of such a commission as that suggested, covering all the details of its organization, and then take steps to secure the enactment of the bill bringing to its support the organized efforts and influence of the entire membership of both societies.

N. I. STONE: I wish time would permit to go into the many points that I should like to cover with reference to our government statistics. A great deal of it is wrong fundamentally and many of its shortcomings are due to working with imperfect tools.

I heartily agree with what Professor Mitchell has said about the shortcomings of the statistical staff in the average government office. In the exact science of physics they have long learned the lesson that the accuracy of knowledge established by their research work depends upon the accuracy of the instruments employed. In the army they would not ordinarily place a private in the ranks in charge of a regiment merely because he was a bright or brave fellow. They have recognized the necessity of scientific training as a qualification for an officer. Even our politicians would not think of appointing a man who is not a trained lawyer to a position requiring the handling of legal matters. Certainly no one but a graduate of a recognized medical college would be permitted to hold a position of responsibility in the public health service. But statistics has not been recognized as yet either as a science or a profession, and anybody who can add up a column of figures can acquire the title of statistician and be appointed to direct most important statistical work if he is lucky enough to get into the good graces of the appointing powers.

In Germany no man would be allowed to hold the position of chief of a statistical bureau or even a subordinate position requiring expert statistical knowledge who is not a university graduate who has specialized in the science of economics and statistics. Until we get this principle officially recognized in this country, we shall be confronted with the condition referred to by Professor Mitchell.

Under these conditions it is not surprising that we are still without a definite policy and set of principles to govern the biggest statistical work that the government is doing, our census. The

decennial schedules have been changed radically from time to time, corresponding to the altering views of the various directors succeeding one another at the whim of politics.

In connection with the forthcoming Census of Manufactures of 1915 the present Director has applied to chambers of commerce and various manufacturers' associations to make suggestions for the improvement of the schedules. In this connection as a member of the Committee on Statistics of the Chamber of Commerce of the United States, I was asked to undertake the task of analyzing the present schedules and suggesting such changes as would make the census statistics of manufactures of greater practical value. In connection with this work I addressed specific questions to leading manufacturers and officers of their organizations and found the greatest variety of views as to the proper function of census statistics prevailing among business men. At one extreme were those who saw no value in government statistics and believed that if the census can not be abolished altogether it ought to be confined to the fewest and simplest questions, while at the other end were some of the largest business concerns of the country and most representative business organizations which thought that the census ought to present most elaborate statistics as to every element of the cost of production in every industry it covers and even that the census ought to prescribe a uniform system of cost accounting for all the business concerns in the country. One of the most influential commercial bodies in the country thought it of the greatest importance for the census to present detailed classified wage statistics, which the census does not attempt to do at present.

The census is not the only branch of government statistics, however, that presents room for improvement. Dr. Durand and I, before we left the government service, had been engaged for some time in a study of our statistics of foreign commerce, in response to a demand from commercial organizations that the government publish statistics of foreign commerce in greater detail. Before we proceeded very far in our study, we discovered that before thinking of the luxury of greater detail it would be necessary to insure greater accuracy in the statistics of our exports and imports on the scale on which published at present. One would imagine that statistics of imports, being based upon returns of customs officials who jealously guard the interests of the Treasury, would be exceptionally accurate. We found to our surprise that, while the aggregate value of imports was fairly accurate, that of

individual commodities and classes of commodities was in some cases as much as 25 per cent off. When we came to the statistics of exports we found the inaccuracy so great that no one can at present venture even an approximate estimate of the degree of inaccuracy. Certain it is that our exports are not only greatly and deliberately underestimated in a great many cases by individual exporters, but that there are instances, the frequency of which we had no means of ascertaining, of entire cargoes of exported merchandise not being reported in our export statistics, due to the imperfect machinery for the registration of exports, which is nearly a hundred years old and badly out of joint with present-day commercial conditions. I am glad to say that the Department of Commerce is now thoroughly alive to this situation and is considering means of overcoming this defect.

Time will not permit to go into other phases of government statistics and I wish to conclude by seconding most heartily the resolution proposed by Professor Willcox. I wish to say, however, that I do not expect any radical improvement in the situation until we have a committee paid either by the government or by private organizations, so as to enable a number of competent men to devote their undivided attention to this work. Dr. Meeker's experience is not an exceptional one. We are all busy people and have pressing work to do while earning a living. The task before us is of vast magnitude and will take years to accomplish, and, in my opinion, if the committees to be appointed by this Association and the American Statistical Association succeed in bringing about the appointment of a competent, salaried government commission or of a commission whose expenses are to be defrayed by the joint contributions of such organizations as our own and the various commercial, labor, and the other bodies which may have an interest in the work, they will have taken the longest step for accomplishing the great task that is before us.